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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,908	ROUXEL ET AL.	
	Examiner	Art Unit	
	LEON-VIET Q. NGUYEN	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/18/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 6/18/07 was filed after the mailing date of 6/18/07. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

1. Claims 4, 8, and 9 are objected to because of the following informalities:

   a. In claims 4, 8, and 9, it is uncertain what "it" is referring to.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 2 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 2, is said element corresponding to an element in the main constellation or the secondary constellation?

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-12 and 16-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kandala et al (US6977972) in view of Kramer et al (US20050111564).

Re claim 1, Kandala teaches a method for reception of a signal modulated according to a main constellation, called a main signal (col. 8 lines 13-15 and lines 43-46, a 64-QAM multilevel signal), and at least one signal modulated according to a secondary constellation, called a secondary signal (fig. 2, col. 4 lines 24-26, a 16-QAM multilevel signal), said secondary constellation being included in said main constellation (16-QAM constellations are included within 64-QAM constellations), said method comprising:

demodulating said main signal (demodulator 26 in fig. 1), outputting a confidence bit for each of the elements in the main constellation (col. 8 lines 29-46, the log likelihood ratio), related to reception of said element (col. 2 lines 28-30, col. 3 lines 7-12, the reliability), called a main confidence bit,

determining at least one confidence bit related to reception of at least one element of said secondary constellation (col. 4 lines 37-43), called a secondary confidence bit.

Kandala fails to teach determining a secondary confidence bit using at least one of said main confidence bits, so as to demodulate the secondary signal. However Kramer teaches generating a second reliability value from a first set of reliability values (¶0050-¶0051, claim 8, the second set of log-likelihood ratio values generated from the first set of log-likelihood ratio values). The log-likelihood values are interpreted to be confidence bits.

Therefore taking the combined teachings of Kandala and Kramer as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Kramer into the method of Kandala. The motivation to combine Kramer and Kandala would be to facilitate decoding the received channel information at the highest possible data rate with a reduced bit error rate (¶0011 of Kramer).

Re claim 2, the modified invention of Kandala teaches a reception method wherein said element is one of the bits transmitted by a symbol of said main (col. 8 lines 43-44 of Kramer) and/or secondary constellation.

Re claim 3, the modified invention of Kandala teaches a reception method wherein said main confidence bit is a hard reception decision of said bit in said main signal (col. 9 lines 6-9 of Kandala).

Re claim 4, the modified invention of Kandala teaches a reception method wherein it comprises a prior step to determine the log likelihood ratio (LLR) of said bit called "soft bit" (col. 8 lines 47-62 of Kandala), for at least some of said bits of said main signal (col. 8 lines 47-49 of Kandala), using said associated hard decision (col. 9 lines 4-13 of Kandala).

Re claim 5, the modified invention of Kandala fails to explicitly teach a reception method wherein said prior determination step uses a criterion belonging to the group comprising:

a Log-Map criterion;

a Max-Log-Map criterion;

a SOVA (Soft-Output Viterbi Algorithm based on the maximum likelihood criterion for detection of the most probable sequence),

and/or an approximation of one of these criteria.

However log-MAP, max-log-MAP, and soft-output Viterbi Algorithm are well known MAP derivatives used in soft output decoders.

Re claim 6, the modified invention of Kandala teaches a reception method wherein said main and/or secondary confidence bit associated with a bit is a log likelihood ratio of said bit (col. 8 lines 43-44 of Kandala), called the main and/or secondary soft bit.

Re claim 7, the modified invention of Kandala teaches a reception method wherein said step of determining said secondary confidence bit comprises the following sub-steps:

said secondary "soft bits" (¶0050 of Kramer, the second set of L-values) are expressed as a function of a posteriori probabilities of symbols in said secondary constellation (¶0045 of Kramer, the L-values are channel reliability values which are interpreted to be a posteriori probabilities), said symbols in said secondary constellation (col. 4 lines 24-26 of Kandala, the 16-QAM constellation) also belonging to said main constellation (col. 8 lines 13-15 of Kandala, the 64-QAm constellation), so as to obtain a first expression (¶0050 of Kramer, it would be obvious to represent the second set of L-values by an expression);

the a posteriori probabilities of bits in said main constellation (¶0049 of Kramer, the first set of L-values) are expressed as a function of the a posteriori probabilities of symbols in said main constellation (it would be obvious to represent the second set of L-values by an expression), bringing out the soft bits of said main constellation (col. 8 lines 47-49 of Kandala), output during said demodulation step of said main signal so as to obtain a second expression (col. 8 lines 29-46 of Kandala).

Re claim 8, the modified invention of Kandala fails to explicitly teach a reception method wherein it also comprises a sub-step of mathematically simplifying said first expression, using a saturated linear approximation or a piecewise linear approximation. However linear approximation techniques are well-known and commonly used in mathematics.

Re claim 9, the modified invention of Kandala teaches a reception method wherein it also comprises a sub-step to classify symbols in said main constellation so as to minimise the number of soft bits in said main constellation used during the calculation of soft bits in said secondary constellation (col. 8 lines 47-62 of Kandala).

Re claim 10, the modified invention of Kandala teaches a reception method wherein the element is a symbol in said main (col. 8 lines 43-44 of Kandala) and/or secondary constellation.

Re claim 11, the modified invention of Kandala teaches a reception method wherein said main confidence bit associated with a symbol is an a posteriori probability of a symbol in said main constellation (col. 8 lines 43-44 of Kandala, the log likelihood ratio is an a posteriori probability).

Re claim 12, the modified invention of Kandala fails to explicitly teach a reception method wherein during said step of demodulating said main signal, said main confidence bits are calculated using one of the detection algorithms belonging to the group comprising:

a Max-Log-Map;

a Log-Map;

SOVA (Soft-Output Viterbi Algorithm based on the maximum likelihood criterion for detection of the most probable sequence);

DDFSE (Delayed Decision Feedback Sequence Estimation);

RSSE (Reduced-State Sequence Estimation);

M-algorithm;

T-algorithm.

However log-MAP, max-log-MAP, and soft-output Viterbi Algorithm are well known MAP derivatives used in soft output decoders. The soft decision output is a measure of reliability and is interpreted to be confidence bits.

Re claim 16, the modified invention of Kandala teaches a reception method wherein said main and/or secondary constellations belong to the group comprising:

M-QAM modulations, where M=2m (col. 8 lines 13-15 of Kandala);

N-PSK modulations, where N=2n (col. 3 lines 65-67 of Kandala);

a linearised GMSK or MSK modulation.

Re claim 17, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be obvious and necessary to have a receiver to perform the method as claimed in claim 1.

Re claim 18, the modified invention of Kandala fails to explicitly teach a receiver wherein this receiver is of the type belonging to the group comprising:

GSM receivers;

GPRS receivers;

EDGE receivers.

However, GSM, GPRS, and EDGE are all well-known wireless communication standards.

Re claim 19, the claimed limitations recited have been analyzed and rejected with respect to claim 2.

Re claim 20, the claimed limitations recited have been analyzed and rejected with respect to claim 3.

Re claim 21, the claimed limitations recited have been analyzed and rejected with respect to claims 4 and 5.

Re claim 22, the claimed limitations recited have been analyzed and rejected with respect to claim 7.

Re claim 23, the claimed limitations recited have been analyzed and rejected with respect to claim 10.

Re claim 24, the claimed limitations recited have been analyzed and rejected with respect to claim 12.

Re claim 25, the claimed limitations recited have been analyzed and rejected with respect to claim 16.

3. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kandala et al (US6977972) and Kramer et al (US20050111564) in view of Park (US20040128592).

Re claim 13, the modified invention of Kandala fails to teach a reception method wherein said detection algorithm being two-directional, said secondary confidence bits associated with the symbols in said secondary constellation are secondary soft bits corresponding to the log likelihood ratio (LLR) values of said bits of said symbols, and are determined by the following sub-steps:

selecting a sub-set of a posteriori probabilities of symbols in said secondary constellation among the set of a posteriori probabilities of available symbols in said main constellation;

determining said secondary soft bits as a function of said sub-set of a posteriori probabilities of symbols in said secondary constellation, said symbols in said secondary constellation also belonging to said main constellation.

However Park teaches selecting a sub-set of a posteriori probabilities of symbols in said secondary constellation among the set of a posteriori probabilities of available symbols in said main constellation (figs. 3-5);

determining said secondary soft bits as a function of said sub-set of a posteriori probabilities of symbols in said secondary constellation, said symbols in said secondary constellation also belonging to said main constellation (¶0056).

Therefore taking the modified teachings of Kandala and Kramer with Park as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Park into the method of Kandala and Kramer. The motivation to combine Park, Kramer and Kandala would be to give a greater resolution for quantization (¶0056 of Park).

Re claim 14, the claimed limitations recited have been analyzed and rejected with respect to claim 5.

Re claim 15, the modified invention of Kandala teaches a reception method wherein since said detection algorithm is single-directional, said secondary confidence bits associated with symbols in said secondary constellation are secondary soft bits corresponding to the log likelihood ratio (LLR) values of said bits of said symbols, and are determined by the following sub-steps:

determining the sign of secondary soft bits as a function of the value of bits of symbols in said main constellation (col. 8 lines 47-62 of Kandala).

Kandala fails to teach selecting a sub-set of a posteriori probabilities of symbols in said secondary constellation among the set of a posteriori probabilities of available symbols in said main constellation; and

determining said secondary soft bits as a function of the sub-set of a posteriori probabilities of symbols in said secondary constellation, said symbols in said secondary constellation also belonging to said main constellation;

However Park teaches selecting a sub-set of a posteriori probabilities of symbols in said secondary constellation among the set of a posteriori probabilities of available symbols in said main constellation (figs. 3-5);

determining said secondary soft bits as a function of said sub-set of a posteriori probabilities of symbols in said secondary constellation, said symbols in said secondary constellation also belonging to said main constellation (¶0056).

Therefore taking the modified teachings of Kandala and Kramer with Park as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Park into the method of Kandala and Kramer. The motivation to combine Park, Kramer and Kandala would be to give a greater resolution for quantization (¶0056 of Park).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

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